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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/517,417	03/02/2000	Olivier Isson	S1022/8316	4387
7590	02/19/2004		EXAMINER	
James H Morris Wolf Greenfield & Sacks PC 600 Atlantic Avenue Boston, MA 02210			ODLAND, DAVID E	
			ART UNIT	PAPER NUMBER
			2662	7
DATE MAILED: 02/19/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	09/517,417	ISSON ET AL.	
	<b>Examiner</b> David Odland	<b>Art Unit</b> 2662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.  
 2a) This action is **FINAL**.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-27 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-27 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>4</u> . | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Drawings***

1. Figure 5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 6-27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Referring to claims 6,7,17 and 18, the specification does not adequately describe how the first portion is 'estimated', in such a manner that would allow one of ordinary skill in the art to make and use the claimed invention.

Claims 8-16 and 19-27 are rejected because they depend on rejected claims.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

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5. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "...the signal received on the subscriber line..." There is a lack of antecedent basis for this limitation in the claim.

Claim 1 also recites "...subtracting...an estimated echo obtained by a filter from a signal portion following the end of the current outgoing symbol..." in lines 10-12. This limitation is confusing; it is unclear what is being subtracted and how a filter can be from a signal portion.

Lastly, claim 1 recites "...and adding thereto, through said filter, a beginning portion of the current outgoing symbol..." in line 12. It is unclear what the beginning portion of the current symbol is being added to.

Claim 4 recites "...the delay line..." and "...said time interval from the end of each outgoing symbol..." There is a lack of antecedent basis for these limitations in the claim.

Claim 5 recites "...said time interval from the beginning of each outgoing symbol..." in line 3. There is a lack of antecedent basis for this limitation of the claim.

Claims 2-5 are also rejected because they depend on rejected claims.

#### ***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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7. Claims 1,4,6-8,11,12,14,15,17-19,22 and 23, as best understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Ho et al. (USPN 5,317,596), hereafter referred to as Ho.

Referring to claim 1, Ho discloses a digital subscriber line transmission system (a data transmission system (see figure 4)) comprising an inverse fast Fourier transform circuit generating successive outgoing time domain symbols on a subscriber line from respective groups of digital frequency domain coefficients (a N point IFFT circuit (see item 102 of figure 4)); a fast Fourier transform circuit generating groups of digital frequency domain coefficients from respective incoming time domain symbols received on the subscriber line (an N point FFT circuit for incoming symbols (see item 104 in figure 4)), a current incoming symbol being delayed with respect to a current outgoing symbol by a predetermined time interval (incoming symbols are echoed and thus delayed from the outgoing symbols (see figure 4 and column 6 and 7)); and means for, during an end portion of a current incoming symbol, subtracting from the signal received on the subscriber line an estimated echo obtained by a filter from a signal portion following the end of the current outgoing symbol (a time domain echo is subtracted from the incoming block (see item 104 of figure 4)), and adding thereto, through said filter, a beginning portion of the current outgoing symbol (a frequency echo portion related to the outgoing signal is added to the incoming block to eliminate echo (see item 104 of figure 4)), wherein said portions have a duration at least equal to said predetermined time interval (the incoming blocks are echoes and thus are delayed (see figures 3 and 4 and columns 5 and 6)).

Referring to claim 4, Ho discloses the system discussed above. Furthermore, Ho discloses a FIFO memory receiving the outgoing symbols (a block delay circuit for storing outgoing symbols (see item 130 of figure 4)); a subtractor arranged for subtracting the outgoing

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symbols from the output of the delay line (a adder/subtractor for subtracting the outgoing symbol from the output of the delay block circuit (see item 140 in figure 4)); said filter receiving the output of the subtractor and enabled only during said time interval from the end of each outgoing symbol (the Tail Cancellation circuit receives the output of the subtractor and filters the Tail (or end) of the outgoing symbol (see item 150 of figure 4)); and an adder receiving the output of the filter and said incoming symbols (an adder receives the output of the Tail Cancellation circuit and the incoming symbols (see the adder in item 104 of figure 4 that receives the  $e(n)$ " input)).

Referring to claims 6 and 17, Ho discloses a digital subscriber line (DSL) transmission system in which at least a first outgoing symbol and a second outgoing symbol are successively transmitted, and an echoed first outgoing symbol and an echoed second outgoing signal are successively received (a echo cancellation transmission system which continuously transmits and receives symbols (see figure 4)), a method comprising an act of A) compensating at least a first portion of the echoed second outgoing signal based on an estimation of a first portion of the echoed first outgoing symbol (a Ref(f) signal, which is calculated based on the echo of a echoed first signal, is passed back to the echo canceller to adapt for future cancellations in the next received signal echoes (see figure 4 and column 6 lines 1-3 and 50-59)).

Referring to claims 7 and 18 Ho discloses the system discussed above. Furthermore, Ho discloses that the act A) includes an act of: essentially replacing the first portion of the echoed second outgoing signal with the estimation of the first portion of the echoed outgoing symbol (the first outgoing signal is used for canceling the echo of the next outgoing signal (see column 6 lines 50 through column 7 line 44)).

Referring to claims 8 and 19 Ho discloses the system discussed above. Furthermore, Ho discloses that the first and second outgoing symbols include a cyclic prefix (the signals include cyclic prefixes (see column 6 lines 50-67)).

Referring to claims 11,12,14,15,22 and 23 Ho discloses the system discussed above. Furthermore, Ho discloses that the act A) comprises acts of:

A1) obtaining a difference between a first portion of the first outgoing symbol and a first portion of the second outgoing symbol (the end of a previous block is subtracted from the end of the current block (see column 7 lines 15-24));

A2) applying an estimated transfer function of echo generation to the difference to generate an echo compensation signal (an echo cancellation signal is generated (see signal "e(n)" of figure 4)); and

A3) adding the echo compensation signal to at least the first portion of the echoed second outgoing symbol (the adder cancels the echo of the outgoing signal (see the adder in item 104 of figure 4));

wherein the act A1) includes an act of applying a one symbol delay to at least the first and second outgoing symbols (the delay block is delayed for one cycle (see column 7 lines 15-44));

wherein the act A2) includes an act of: calculating the estimated transfer function based at least on a plurality of outgoing symbols and a plurality of incoming symbols (the Ho system operates continuously thus plural symbols will provide the echo signal (see figure 4)).

wherein each outgoing symbol and each incoming symbol has a total symbol length (inherently, the symbols have a total length (see figure 4)), and wherein the act of calculating the

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estimated transfer function includes an act of: calculating the estimated transfer function based only on a portion of the total symbol length (the tail portion is used to calculate the echo signals (see column 7 lines 15-44)).

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2,13 and 24-27, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho in view of Kioke (USPN 5,084,865), hereafter referred to as Kioke.

Referring to claims 2,13 and 24, Ho discloses the system discussed above. Ho does not disclose that the filter is a finite impulse response (FIR) filter used to continuously calculate signal coefficients. However, Kioke discloses an echo cancellation system, which uses an FIR to calculating the coefficients of signals (see figure 1 and abstract). It would have been obvious to one skilled in the art at the time of the invention to implement FIR filters in Ho to perform coefficient calculation because FIR filters provide ‘linear phase’ characteristics that provide delay to the input signals without phase distortion and they also provide desirable numeric properties (i.e. since there is no feedback in FIR filters, coefficient calculations are more reliable). Therefore, using a FIR filter in Ho would make Ho more reliable and robust.

Referring to claims 25 and 26, Ho discloses the system discussed above. Furthermore, Ho discloses that the at least one controller further includes at least one calculating unit

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configured to calculate the estimated transfer function based at least on a plurality of outgoing symbols and a plurality of incoming symbols (the Ho system operates continuously thus plural symbols will provide the echo signal (see figure 4));

wherein each outgoing symbol and each incoming symbol has a total symbol length (inherently, the symbols have a total length (see figure 4)), and wherein the at least one calculating unit is configured to calculate the estimated transfer function based only on a portion of the total symbol length (the tail portion is used to calculate the echo signals (see column 7 lines 15-44)).

Referring to claims 27, Ho discloses the system discussed above. Ho does not disclose that the act of calculating the estimated transfer function includes an act of calculating the estimated transfer function based on approximately 5% of a total number of samples of each symbol. However, It would have been obvious to one skilled in the art at the time of the invention to calculate the echo in this manner because if only 5% of the samples are needed the system will be able to perform the estimation faster thus making the Ho system operate faster.

10. Claims 3,5,9,10,16,20 and 21, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho.

Referring to claim 3, Ho discloses the system discussed above. Ho does not disclose that the predetermined time interval is equal to a maximum delay between the incoming and outgoing symbols. However, It would have been obvious to one skilled in the art at the time of the invention to implement the delay in Ho to this maximum since any shorter delay may cause the

system to miss the incoming symbol, thus the signal will not be properly sample and result is errors.

Referring to claim 5, Ho discloses the system discussed above. Ho does not disclose that the FIFO memory has a size for storing only the beginning portion of each outgoing symbol, is write-enabled during said time interval from the beginning of each outgoing symbol, and read-enabled during said time interval from the end of each outgoing symbol. However, it would have been obvious to one skilled in the art at the time of the invention to implement this feature in Ho because such a feature would reduce the power requirements of the system since the circuit would not be enabled for the entire length of the symbol, thus saving power in the HO system.

Referring to claims 9,10,20 and 21, Ho discloses the system discussed above. Ho does not disclose that the first portion of the echoed second outgoing signal and the first portion of the echoed first outgoing symbol have a same length that is less than or equal to a maximum delay between transmitted and received symbols and not exceeding 5% of the total length. However, it would have been obvious to one skilled in the art to limit the lengths of the symbol portions to these parameters because doing so would require less bandwidth and would ensure that the its within the maximum delay, thereby making Ho more bandwidth efficient and reliable.

Referring to claims 16, Ho discloses the system discussed above. Ho does not disclose that the act of calculating the estimated transfer function includes an act of calculating the estimated transfer function based on approximately 5% of a total number of samples of each symbol. However, It would have been obvious to one skilled in the art at the time of the invention to calculate the echo in this manner because if only 5% of the samples are needed the system will be able to perform the estimation faster thus making the Ho system operate faster.

***Conclusion***

11. The following prior art, which is made of record and not relied upon, is considered pertinent to applicant's disclosure:

- a. U.S. Patent Number 6,072,782 to Wu.
- b. U.S. Patent Number 6,535,550 to Cole.
- c. U.S. Patent Number 6,546,055 to Schmidl et al

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Odland, who can be reached at (703) 305-3231 on Monday – Friday during the hours of 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou, can be reached at (703) 305-4744. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist, who can be reached at (703) 305-4750.

deo

February 16, 2004



JOHN PEZZLO  
PRIMARY EXAMINER